Valve Add On Instructions

Designed Using Studio5000 Version 23

Note: The codes obtained from PLCCodeWorks.com are not intended to be run without modification as an end user application. The codes WILL NOT match the specific requirements of your environment/project. The codes are provided ONLY as an aid to developing an application. You can modify the codes and/or implement the codes in any desired project.

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1 FUNCTION BLOCKS

1.1 Valve (Single & Double Acting) Function Block

Valve Function Block		
Digital Inputs to Block		**Digital Outputs**
Alarm Active (alm_act)		Healthy (hty)
Open Permissive (ilkopn)		
Close Permissive (ilkcls)		
Enable Input Pulse Control (inpulse_enable)		
Enable Auto Mode (enbaut)		
Enable Manual Mode (enbman)		
Enable Out Of Service Mode (enboos)		
Request Auto Mode (reqaut)		In Auto Mode (modaut)
Request Manual Mode (reqman)		In Manual Mode (modman)
Request Out Of Service Mode (reqoos)		In Out Of Service Mode (modoos)
Request Auto Open (req_autopn)		Open Command (cmd_opn)
Request Auto Close (Input Pulse Enabled)		Close Command (cmd_cls)
Request Manual Open (req_manopn)		
Request Manual Close (req_mancls)		
Open Status (in_opnd)		
Close Status (in_clsd)		

1.1.1 Digital Inputs

Alarm Active	A valve alarm is active in the valve alarms block. When there is an active alarm, the valve becomes unhealthy and the valve function block will not generate any commands. The valve will become healthy when there are no active alarms. Active alarms include failed to open, failed to close.
Open Permissive	Open permissive applies to both auto mode and manual mode, unless stated otherwise. If inactive will prevent the valve from opening. Once the valve is opened and the open permissive becomes inactive, the valve open command will be inactive. The open permissive should be listed in the valve device routine and mapped to the valve software block. When the open permissive is inactive, no alarms are to be created as open permissives are purely process related.
Close Permissive	Close permissive applies to both auto and manual modes, unless stated otherwise. When inactive will prevent the valve from closing. Once the valve is closed and the close permissive becomes inactive, the valve close command will be inactive. The valve close permissive should be listed in the valve device

	routine and mapped to the valve software block. When the close permissive is inactive, no alarms are to be generated as the close permissive is purely process related.
Enable Input Pulse Control	When enabled, the function block should be able to detect the pulsed request auto open/close command and needs to latch internally in the function block. When input pulse control in disabled, the request auto open command needs to be latched externally to the function block, hence the open command from the function block will be active only when the request auto open command is active.
Enable Auto Mode	When enabled allows operators to select auto for the valve operation mode. When not enabled, auto mode is not available.
Enable Manual Mode	When enabled allows operators to select manual for the valve operation mode. When not enabled, manual mode is not available.
Enable Out Of Service Mode	When enabled allows operators to select out of service for the valve operation mode. When not enabled, out of service mode is not available.
Request Auto Mode	A request from the HMI/SCADA to place the function block into auto mode.
Request Manual Mode	A request from the HMI/SCADA to place the function block into manual mode.
Request Out of Service Mode	A request from the HMI/SCADA to place the function block into out of service mode.
Request Auto Open	Auto mode open command. This is an open command that is generated from the unit or system/group control or sequence routines. This command can either be a pulsed command if the input pulse control is enabled or a latched command if the input pulse control is disabled. This command will be ignored in all modes except auto mode.
Request Auto Close (Input Pulse Enabled)	Auto mode close command. This is a close command that is generated from the unit or system/group control or sequence routines. This command will be ignored in all modes except auto mode. This command can only be used when the input pulse control is enabled hence can only be a pulsed command.
Request Manual Open	A request from the HMI/SCADA to open the valve in the forward direction. This request will be ignored in all modes except manual mode.
Request Manual Close	A request from the HMI/SCADA to close the valve from running. This request will be ignored in all modes except manual mode.
Open Status	Digital Input feedback into I/O module for valve is open status.
Close Status	Digital Input feedback into I/O module for valve is closed status.

1.1.2 Digital Output

Healthy	The valve Software block is healthy. The valve will be healthy when there are no active alarms and either auto mode or manual mode is selected.
In Auto Mode	The valve is in Auto mode. When in auto mode, the unit or system/group control routines control the operation of the valve. All open and close permissives shall apply.
In Manual Mode	The valve is in Manual mode. Manual mode authorises the operator to execute commands from the HMI/SCADA. Automatic commands which may have been issued shall not have any effect on the device. Open and close permissives do apply.
In Out Of Service Mode	The valve is in out of service mode. No commands will be executed and no alarms shall be raised.
Open Command	Open command generated by the valve function block. This command is a digital output to energise the valve to open. For single and double acting valves, when this command is active, the valve will open. For single acting valves when this command is not active, the valve will close.
Close Command	Close command generated by the valve function block. This command is a digital output to energise the valve to close. For double acting valves, when this command is active, the valve will close.

The valve open command will be generated when:

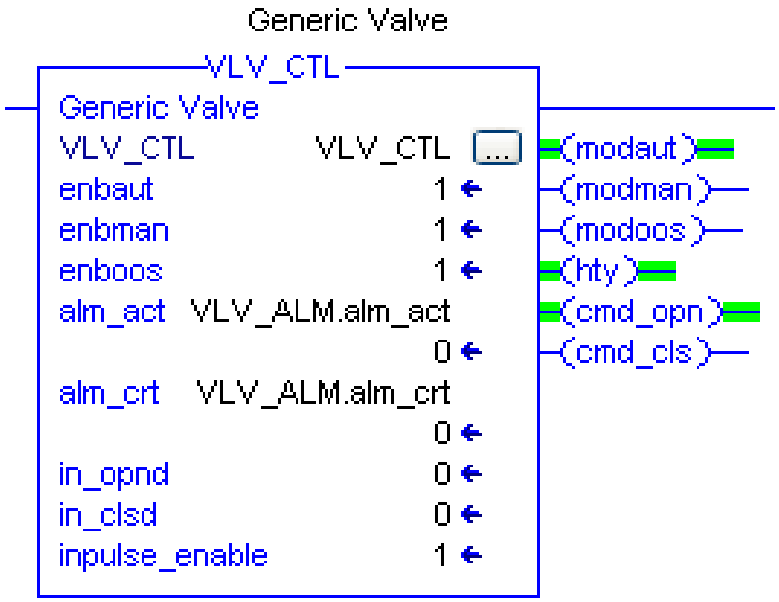
- The valve is healthy (no alarms active)
- The valve is In auto mode
    - Open permissive active
    - Request Auto Open command is latched (Input Pulse Control disabled) or pulsed (Input Pulse Control enabled)
- The valve is in manual mode
    - Open permissive is active
    - Request Manual Open is detected

The valve close command will be generated when:

- The valve is healthy (no alarms active)
- The valve is In auto mode
    - Close permissive active
    - Request Auto Open command is unlatched (Input Pulse Control disabled) or Request Auto Close command pulsed (Input Pulse Control enabled)
- The valve is in manual mode
    - Close permissive is active
    - Request Manual Close is detected

1.1.3 Studio5000 Example Function Block

The function block below is an example used on Studio5000.



1.2 Valve Alarm Function Block

Valve Alarm Function Block		
Digital Inputs to Block		**Digital Outputs**
		I/O Fault (io_flt)
Emergency Stop Enable (est_enable)		Emergency Stop Alarm Active (est_alm)
Failed To Open Enable (fto_enable)		Failed To Open Alarm Active (fto_alm)
Failed To Close Enable (ftc_enable)		Failed To Close Alarm Active (ftc_alm)
(Alarms can be added)		
I/O Healthy (io_hty)		Alarm Active (alm_act)
Emergency Stop Healthy (est_hty)		
Open Command Active (cmd_opn)		
Close Command Active (cmd_cls)		
Open Status (in_opnd)		
Close Status (in_clsd)		
Valve Out Of Service (modoos)		

1.2.1 Digital Inputs

Emergency Stop Enable	Enable Emergency Stop (EST) Alarm. Alarm will be generated when enabled. No alarm will be generated when disabled.
Failed To Open Enable	Enable Failed To Open (FTO) Alarm. Alarm will be generated when enabled. No alarm will be generated when disabled.
Failed To Close Enable	Enable Failed To Close (FTC) Alarm. Alarm will be generated when enabled. No alarm will be generated when disabled.
(Alarms can be added)	Any alarms required can be added to the Valve Alarm Block
I/O Healthy	Input signal for I/O module status. When the required I/O modules are healthy, then VSD I/O is healthy.
Emergency Stop Healthy	Input signal from I/O module for emergency Stop healthy.
Open Command Active	Input from Valve Control Function Block for an open command is active. This is used for the generation of Failed to Open alarms.
Close Command Active	Input from Valve Control Function Block for a closed command is active. This is used for the generation of Failed to Closed alarms.
Open Status	Input from Valve Control Function Block for the valve open status. This is used for the generation of Failed to Open alarm.
Close Status	Input from Valve Control Function Block for the valve closed status. This is used for the generation of Failed to Closed alarms.

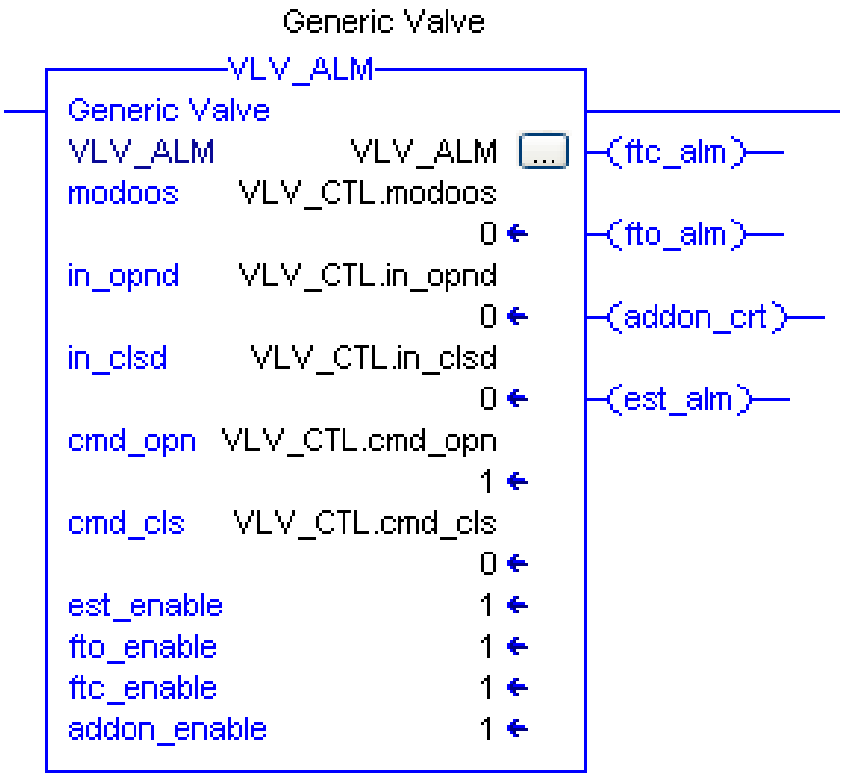
Valve Out Of Service	Input from Valve Control Function Block for valve is in out of service mode. When out of service, no alarms will be generated.

1.2.2 Digital Output

I/O Fault	The I/O fault is always enabled. The I/O fault is active when an I/O module is not healthy. Alarm is not generated, however the code can be adjusted to include an alarm. When I/O fault is active, no other alarms will be generated. All other alarms will only be generated when I/O is healthy.
Emergency Stop Alarm Active	An Emergency Stop alarm is active. Emergency Stop push button(s) are active. Alarm is latched until condition is healthy and reset.
Failed To Open Alarm Active	The Failed To Open alarm is active. Valve has failed to open when commanded to open. Alarm is latched until reset.
Failed To Close Alarm Active	The Failed To Close alarm is active. Valve has failed to close when commanded to close. Alarm is latched until reset.
Alarm Active	An alarm is active. This signal will be active when any one alarm is active. This signal is mapped to the valve control block and will result in the valve being unhealthy if alarm is active.

1.2.3 Studio5000 Example Function Block

The function block below is an example used on Studio5000.



1.3 Device Operation Statistics Function Block

Operation Statistics Function Block		
Digital Inputs		**Digital Outputs**
Operations Count Reset (cntrst)		High Operation Alarm (hi_op_flt)
Alarm Reset		
Analogue Inputs		**Analogue Outputs**
Maximum Operation Setpoint (DINT)		Current Number Of Operations (DINT)
(maxopcnt)		Previous Number Of Operations (DINT)
		Current Total Run Time (Accumulative) (DINT)
		Previous Total Run Time (DINT)

1.3.1 Studio5000 Example Function Block

The function block below is an example used on Studio5000.

